

**METHOD FOR FORMING NOVEL BARC OPEN FOR
PRECISION CRITICAL DIMENSION CONTROL**

ABSTRACT

[0058] A method for forming an opening in a semiconductor device is provided. In one embodiment, a bottom anti-reflective coating (BARC) layer is formed overlying an insulation layer of a substrate. A patterned photoresist layer including at least one opening therein is formed overlying the BARC layer. The BARC layer and the insulation layer are etched by employing the patterned photoresist layer as a mask in a process comprising: positioning the semiconductor device into a chamber and introducing a first gas including fluorocarbon gas for etching and polymer formation; introducing into the chamber a second gas containing oxygen for polymer formation control; partial etching the BARC layer defined by the at least one opening and subsequently forming a polymer layer on the inside of the at least one opening; repeating the step of partial etching and polymer formation to form the at least one opening in the BARC layer; and continuing the step of partial etching and polymer formation to form the at least one opening in the insulation layer.